

NORTH CAROLINA'S COASTAL SYSTEM

Regional Setting

The North Carolina coastal system (Fig. 1) consists of about 325 miles of ocean shoreline, 23 inlets, over 5,000 miles of estuarine shoreline, and over 3,000 square miles of brackish-water estuaries. It has two distinct zones that are very different in both their geometry and processes (Fig. 1, Table 1). The Southern Coastal Zone is characterized by a relatively steep land slope compared to the gentler slope of the Northern Zone. Rising sea level has flooded the disparate slopes producing different kinds of barrier islands, inlets, and associated estuaries (Fig. 1). The steeper slope of the Southern Zone produces short, stubby barrier islands that hug the mainland shoreline, resulting in narrow back-barrier estuaries connected to the ocean by 18 inlets. The gentler slope of the Northern Zone produces long barrier islands and a broad expanse of drowned-river estuaries, the vast Albemarle-Pamlico estuarine system. The northern barrier islands are broken by five inlets and project seaward to form the famous Cape Hatteras and associated Outer Banks.



FIGURE 1. The coastal zone of North Carolina. Imagery from a NASA (MODIS) sensor provided by the Institute for Marine Remote Sensing of the College of Marine Science, University of South Florida.

TABLE 1. Coastal characteristics of the Southern and Northern Coastal Zones of North Carolina result from differences in the underlying geologic framework. Figure 1 shows the location of the two zones.

SOUTHERN COASTAL ZONE	NORTHERN COASTAL ZONE
Cretaceous-Miocene Geologic Framework Dominantly Rock Control	Pliocene-Quaternary Geologic Framework Dominantly Sediment Control
Steep Sub-Aerial Slope (ave. = 3 feet/mile)	Gentle Sub-Aerial Slope (ave. = 0.02 feet/mile)
Coastal Plain-Draining Rivers (Many) Black-Water Rivers Low Sediment Input Low Fresh-Water Input	Piedmont-Draining Rivers (4) Brown-Water Rivers High Sediment Input High Fresh-Water Input
Short Barrier Islands--Many Inlets (18) Maximum Astronomical Tides/Currents Maximum Salt-Water Exchange	Long Barrier Islands--Few Inlets (5) Minimal Astronomical Tides Minimal Salt-Water Exchange
Results: Narrow Back-Barrier Estuaries Regularly Flooded Astronomical Tide Dominated High Brackish Salinities	Results: Deeply Embayed Estuaries Irregularly Flooded Wind Tide and Wave Dominated Highly Variable Salinities

The coastal system can be further divided into four coastal geomorphic compartments (Fig. 1). These compartments, defined by capes and associated cape shoals, are known as cusped embayments. Cape shoals are shore-perpendicular, shallow sand bodies that extend seaward for about 10 miles (Diamond Shoals off Cape Hatteras), 15 miles (Lookout Shoals off Cape Lookout), and 30 miles (Frying Pan Shoals off Cape Fear). These vast shoal systems have led many mariners to their demise and the North Carolina coast to the dubious honor of being called the "Graveyard of the Atlantic".

The orientation of each compartment and continental shelf geometry determine wave and current dynamics, astronomical